

CHIRALITY-DEPENDENT HYDROGEN BONDING AND ENERGY OF 1-BENZYL-3-BROMO-5-HYDROXY- 4-[(4-METHYLPHENYL)SULFANYL]-1,5-DIHYDRO- 2H-PYRROLE-2-ONE DIASTEREOMORPHS

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Two crystalline diastereomorphs of *rac*-1-benzyl-3-bromo-5-hydroxy-4-[(4-methylphenyl)sulfanyl]-1,5-dihydro-2H-pyrrole-2-one are obtained and characterized: the racemic compound ($P2_1/c$) and the normal conglomerate ($P6_5$, $P6_1$). The conglomerate is shown to be more thermodynamically preferred while the racemic compound is a metastable form in the entire temperature range studied. These two modifications are formed as a mixture during routine crystallization from a solution and characterized by a similar density, however, their structures significantly differ in the parameters of hydrogen bonds. A small difference in the free energies of two phases at room temperature, which is found by differential scanning calorimetry, explains the experimental availability of both forms during crystallization from the solution. The formation of a stronger hydrogen bond in the conglomerate crystals, which is detected by X-ray diffraction and solid-state vibrational spectroscopy, may be explained by a more favorable arrangement of donor and acceptor groups of the neighboring molecules in a homochiral helix of the conglomerate as compared with a heterochiral dimer, which is the main motif in crystals of the racemic compound.

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INTRODUCTION

The spatial structure of a molecule has been well known to play an important role not only in chemical reactions but also in the biological activity and pharmacological properties of a substance. The chiral nature of biochemical processes implies the diastereomeric discrimination relative to chiral molecules in living organisms. This leads to the fact that, as a rule, only one of two enantiomers of an active compound is most appropriate as a drug rather than its racemate (an equimolar mixture of enantiomers) [1].

The chemical synthesis is often unselective and results in a racemate. This fact and the need for individual enantiomers stimulate the great scientific and commercial interest in efficient processes of separating racemic mixtures [2, 3].

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